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Why They do not Understand - a Model of Knowledge Discourse in the Transition Phase of Globally Distributed Projects

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Abstract

This paper contributes to the field by applying the Soft Systems Methodology (SSM) for building a model, which improves the understanding of the role of project set-up and communication in the transition phase of projects involving global virtual teams. Although research has highlighted the importance of knowledge transfer in offshore outsourced projects, the literature says little about real-world knowledge transfer problems experienced by project managers and provides little guidance for developing solutions. In this paper, we investigate knowledge transfer problems in the transition phase of offshore outsourced software projects and how set-up of the phase influences unstructured knowledge transfer. Using the SSM, we identify relevant constructs and relationships and build a conceptual model. This highlights the importance of an appropriate communication inception as a basis for relationship building and defines a new construct, 'knowledge discourse', which signifies the importance of two-way interaction for the transfer of unstructured knowledge.

1. Introduction

The transition phase of an offshore project is considered to be one of the most critical phases for overall project success. It includes the first joint operational steps amid the uncertainty that immediately follows contract signing, and includes the critical knowledge transfer [1]. Knowledge transfer is defined as the process of knowledge diffusion from knowledge sources to knowledge recipients [2]. In the context of offshoring, this equates to the client conveying the information to the service provider that the service provider needs to complete their tasks.

IT offshoring has become an established IT strategy, especially in large organizations. The practice of relocating software development projects will remain in the years to come, with Asia, and particularly India, as a preferred destination [3]. A developing trend is more and more small-to-medium enterprises entering the field [4].

Offshore outsourcing typically involves ad hoc project teams that do not share a corporate or organizational culture. This presents a challenge to small and medium enterprises (SME) as they must get up to speed with the development process as soon as possible and do not have time for an extended preparatory phase. Additionally, clients are not able to impose their own culture on the service provider team as might be possible with a remotely located development team from the same company, also known as captive centers [5]. Thus, differences in the culture of the client and service provider can often present significant problems for the development process [6].

Software development has been described as a collaborative problem-solving activity where success is dependent upon knowledge transfer, acquisition, information sharing and integration, and the minimization of communication breakdown [7]. Differences in cultural background make the communication processes even more challenging.

Several previous studies have investigated knowledge transfer in IT offshore outsourcing [e.g.8], which indicated that knowledge transfer is a critical success factor and that cultural differences impede knowledge transfer and result in extra costs for the client [9].

The relatively high failure rates that persist in IT offshore outsourcing [10] indicate that project managers continue to struggle to set-up the transition phase to support effective and successful knowledge transfer. The existing research literature provides little guidance or understanding that assists project managers in structuring this key project stage [11]. An additional area that appears to be under-represented in the literature is the influence of cultural dynamics on unstructured knowledge transfer during the transition phase [12]. Unstructured knowledge transfer refers to communication between client and service provider to exchange implicit or embedded knowledge, or in response to unforeseen knowledge gaps [13].

While several scholars have studied structured knowledge transfer [8, 14], only a few have investigated unstructured knowledge transfer [15]. Thus, in this research we explore the complexities of unstructured knowledge transfer in offshore outsourced software development (OOSD) projects, with a particular focus on the challenges faced by SMEs. We set out to answer the following research questions:

RQ1: What kind of knowledge transfer problems do project managers face in the transition phase of offshore outsourced projects?

RQ2: How does the set-up of the transition phase influence unstructured knowledge transfer?

In answering these questions, we seek to identify, structure, and model the elements that project managers on the client side of offshore outsourcing projects can address when setting up the transition phase of their projects to achieve better knowledge transfer outcomes and avoid cost overruns. The research focuses primarily on problems and solutions from the perspective of the client, to reflect that setting-up the transition phase is mostly the responsibility of the client project manager.

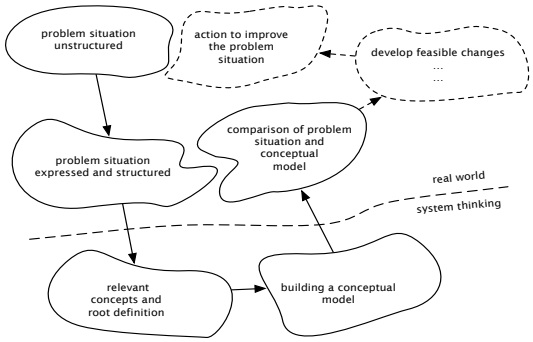
2. Research Methodology

Following the Soft Systems Methodology (SSM), we explore the initiation of an offshore software development project and focus our research on the influences of communication between local and remote team members on knowledge transfer. We have chosen this methodological approach as it is suitable for investigating a real-world problem and is highly applicable to this field of study, where concepts, theory, and technology come together. The SSM is a qualitative, interpretative methodology that is particularly suited to the analysis of complex, ill-defined situations in which there are divergent views about the definition of the problem. The focus of the SSM is on finding solutions to identified problems through model building and testing. We refer readers to Checkland (1981) for an in-depth discussion of this methodology [16].

The SSM comprises identifying and structuring a problem situation, defining the root of the problem, seeking to represent this problem conceptually by building a conceptual model, testing its applicability by comparing it against the real-world, and then deriving solutions to the problem from the model. The SSM is most commonly used by practitioners to analyze and overcome a specific business problem. However, in this paper, we use the approach to investigate a broader set of challenges around the process of knowledge transfer during the transition phase of an OOSD project. As such, we do not define a root definition, but rather express the problem situation as a set of summarized problems identified in two case studies and derive a conceptual model from these, with reference to relevant concepts that we identify in the literature. The Soft Systems approach has been applied by different researchers [e.g.17] in the IS field and has already proven its applicability.

With respect to the broader application of the SSM, which we adopt in this research, we analyze two case studies and define the problem situation based on project challenges, which were observed to be common in both cases. This is with the intention of delineating typical communication related problems, in order to build a conceptual model that is widely applicable.

Figure 1 – Soft Systems Methodology



Rather than seeking to work through the entire SSM (as depicted in Figure 1), this study focuses on the stages of the methodology up to and including building a conceptual model and comparing it against the real-world problem situation. The final two stages (developing feasible changes and taking action to improve the problem situation), shown in dashed lines in Figure 1, will be addressed in subsequent research.

The conceptual model allows us to understand the problem situation as a system design problem and helps us understand and describe what factors influence the transfer of knowledge in OOSD teams and the interplay between those factors.

3. Case Description and Problem Situation

To define and analyze the problem situation, we employed two case studies from existing research projects [18, 19] (previously published, though with a different research focus), for which we had full access to on-site and off-site data and had the opportunity to collect as much data as required. The selected case studies offer an insight into communication processes and knowledge transfer undertaken by SMEs in a

cross-cultural (German-Indian) offshore outsourcing environment.

Both case studies were real OOSD projects involving a German client and Indian service provider (SP). All organizations were SMEs, and none had worked together prior to project commencement. The SPs specialized in software development and the clients also had in-house software developers.

The research, which took place in 2008, was exploratory in nature and relied on in-depth case study [20, 21]. The collection of data included interviews and information from email, instant messenger log files and interviews as primary sources; secondary data included documents and questionnaires regarding software development. Interviews were conducted with participants following the projects, which were semi-structured to allow flexibility and to ensure that the researchers captured any interesting phenomena [20]. Questions were devised to inquire into communication, perceived performance of the knowledge sharing, cultural differences, quality of the relationships, trust between partners, standards and details of the development process, and the appearance of context-relevant information.

In total, the data gathered from client and service provider comprised approximately sixty hours of interviews, most of which was transcribed. The transcripts, together with the chat logs, field notes, and secondary data, provided a rich basis for this research project. From analysis of the case study material, we collected a list of problems that were characteristic of both cases. The following is a summary of the key problems, which we group under three general themes (knowledge, communication, and cultural differences). We include some quotes from the interviews that are characteristic of feedback that we received to illustrate typical problems. However, this section is not intended to be a detailed and thorough description of the case study findings as this is not the main focus of this research. (Interested readers are welcome to contact the authors for more information regarding the case studies.)

Knowledge.

- *"The developer didn't have a clear idea about the requirement specifications and the functionalities that the system was required to deliver. Also, his know-how was not adequate, he was always trying to solve problems, but he didn't have the skills do so. He always needed assistance to solve development and project related informational issues which he wasn't aware."* (Client Business Analyst—BA)
- *"Initially the transfer of requirements to the Indian team seemed reasonably clear and the project started off fine. However, after a couple weeks of silence, I got the impression that the developer was afraid to ask questions."* (Client Project Manager—CPM)

From analysis of the case study material, we identified and delineated the following problems related to knowledge:

(**P1**) The SP developers had little background or business knowledge that was relevant to the context of the project and were commonly deficient in certain technical software development knowledge.

(**P2**) When knowledge gaps were identified in the midst of the project, it proved challenging to address them and caused project delays.

Communication.

- *"After the kick-off meeting we heard nothing from the offshore team for almost 4 weeks. We only got the status, that the team is on track and will meet the milestone."* (CPM)
- *"In the beginning I had some questions but it was difficult for me to talk [to the BA]. I was supposed to ask my project manager but he was very busy at this time and couldn't answer the questions. So, I tried to find solutions myself."* (Service Provider Developer—DEV)
- *"We mainly use telephone or video/audio conference when we work with external partners*, because this is quicker, so we did the same with this project."* (CPM) [*this refers mainly to local partners]

We identified and delineated the following problems related to communication:

(**P3**) Developers on the SP side lacked communication and cooperation competency. Clients reported that team selection had been based solely on reading curriculum vitae, so they had gained no insight into communication and cooperation competency before the project initiation.

(**P4**) There was little planning in terms of media selection. There was a tendency for the client to use their 'usual' media mix without any adaptation to the project context.

Cultural differences.

- *"We had a very successful kick-off meeting via video conferencing. All team members followed the presentation and the offshore team had only a few questions."* (CPM)
- "*We were impressed by the expertise from CPM and BA and the presentation was very detailed. Our project manager had only a few questions, so we thought we could ask him later."* (DEV)

- *"We were surprised that the developer didn't come up with any of his own suggestions for technical solutions, because we knew from his CV that he had a lot of relevant experience."* (CPM)

We identified and delineated the following problems related to cultural differences:
(**P5**) There was a tendency for developers on the SP side not to ask questions, especially if the questions would unveil a lack of technical knowledge.
(**P6**) In fulfilling project tasks, there was a tendency for SP developers only to follow instructions and not use their initiative or experience to achieve positive results.

4. Related Concepts

In line with the SSM, following the expression and structuring of the problem situation, we identify the relevant related concepts that help define the problem situation. We consider the related concepts under the three themes that we grouped the case study problems under: knowledge transfer, cooperation and communication, and cultural differences.

Knowledge transfer has been studied in a variety of business and governmental settings, including political alliances, joint ventures, independent firms, and mergers and acquisitions [14, 22]. However, our literature review revealed that only a few researchers [e.g. 14] have focused their work on the management of the knowledge transfer in an offshore outsourcing context, where knowledge from onshore staff is replaced with offshore resources.

Setting up the transition phase of such a project is challenging, since project managers must account for differences in organizational practices and operational systems. In addition, potential differences in time zone, culture, and language, that are inherent to offshore projects, further exacerbate the challenges of communication and coordination that project managers face. Several authors have identified that effective communication early and throughout the project cycle is critical to project success [22, 23].

Most researchers frame communication within separated work environments (like OOSD teams) as knowledge *transfer* [e.g. 14]. We contend that this misses the duality of the phenomena and that from a system design perspective, the transmittal and acquisition of unstructured knowledge happens in a back-and-forth process of questioning and answering. In this paper, we introduce the term *knowledge discourse*, which describes the process by which the transfer of unstructured knowledge is achieved; successful knowledge transfer is dependent on effective knowledge discourse. The concept of knowledge discourse is influenced by Habermas's theory of communicative action, which distinguishes between communicative action and discourse [24]. Habermas describes how for discourse, terms need to defined, explained and reflected. Participants have to establish a "shared language" and require a communicative setting in which they can interact freely. We use the term *project environment* to describe this communicative setting in which knowledge discourse happens, which is set-up and managed by the client and service provider.

Given that effective, on-going communication is vital for successful knowledge discourse [22], the question of how the team members communicate with each other is obviously a pertinent one. Thus, the selection of communication channels is crucial for such an environment [25], and it is important that suitable communications infrastructure is provided for the team. This leads to the question of how to instigate communication between team members and which communications channels are best suited.

As noted, OOSD projects are distinct from many other offshoring initiatives in that they are defined by two or more separate companies working together in a client-service provider relationship. As such, OOSD projects involve challenges and risks that are not encountered (at least to the same extent) in the other remote sourcing models. The primary challenge is the combining of team members from two or more companies—which may have very different organizational rules, working practices, operational systems, and governance structures—into an effective team [26].

The processes of cooperation and communication have been widely recognized as serious challenges in offshore outsourced projects [27]. Numerous other studies have offered interesting insights into the process of distributed communication [28] and have investigated many of the more problematic aspects of remote interaction. It is known from the literature that personal relationships are important for successfully communicating unstructured knowledge, and that managing virtual teams requires different techniques and leadership behaviors than collocated teams [29]. Nevertheless, most authors have failed to describe the actual process of communication or how it can be instigated and managed to best establish mutual understanding in distributed settings. An exception is a paper [18] that describes the importance of taking context into consideration, in order to initiate contact between remote team members appropriately. The paper concludes that when there is significant distance (including cultural distance) between team members, relationships should be instigated slowly, via non-

synchronous media, thereby allowing team members to gain familiarity gradually.

The processes of communication and cooperation within distributed teams are dependent on the individual competencies of team members. Competencies are described as observable, measurable behaviors, but they are not simply concrete actions. Instead, competencies can be indicators of some underlying intent, which is driven by basic motivations, personality, and values. It is a characteristic of a person that predicts behavior across many workplace situations [30]. If competencies are bound to individuals, it follows that it is important for project managers to have insight into the communication and collaboration competency of team members so that they can take this into account when planning and setting up the transition phase of their projects.

Cultural diversity is inherent to offshore outsourcing in which remote team members have diverse national, organizational, and professional backgrounds [31]. Researchers have shown that management practices are embedded in national cultures and that the search for a universally effective management method is pointless [32]. People in a given cultural context tend to share certain worldviews [33]. In offshore outsourcing, this often results in remote sub-teams having their own (and potentially very different) understanding of how to communicate and cooperate with colleagues, manage conflicts, and interact with authority figures [34]. Hence, for successful knowledge discourse, the sub teams have to bridge their cultural differences.

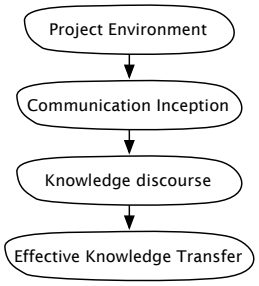
Studies have shown that cultural diversity can be beneficial in terms of creativity and innovation, which is important for knowledge intensive work such as software development [35]. Nevertheless, significant cultural difference between team members is commonly noted as a challenge and a risk factor in OOSD projects because it can create barriers between team members and impede communication and relationship building [36]. Understanding cultural differences is therefore an important task for the project management.

To explain cultural differences, researchers make use of dimensions of cultural variations. Dimensions in this context are aspects of a culture that can be measured in relation to other cultures; we refer to the work of Hofstede for more details [32]. Referring to cultural dimensions helps us to understand and explain why people from other cultures behave and think differently than persons from our own culture [36]. Therefore, in the context of OOSD projects, we need to take the dimensional differences into consideration to understand the challenges of communication, cooperation, and relationship building between team members from different cultures. However, cultural differences can be bridged or at least reduced by choosing people for a project team with the competencies to communicate and cooperate with both sides and to help establish social relationships [37].

5. A Conceptual Model

Following from the investigation of the problem situation and identification of related concepts, we now establish a model (in line with the SSM) that seeks to improve understanding of the transition phase of OOSD projects and depict the key elements that the CPM should consider and address to set up effective knowledge transfer. In the first iteration of the conceptual model (figure 1), we delineate the basic constituents and sequence of the transition phase.

Figure 1: Basic Model



As noted, the project environment is a general term that comprises all aspects of the project context that influence interaction and communication within the team. The communication inception and knowledge discourse elements of the model are the core communication processes undertaken in the transition phase. Communication inception comprises the first engagement of operational (i.e. non-managerial) team members with the project and the initial interaction between local and remote operational team members. The CPM controls the communication inception through defining media selection and interaction patterns and determining how the project is introduced. Particularly for operational team members, the first contact with their remote colleagues is important as it can set the tone for their relationship, which is known to have a bearing on communication efficiency. Through an appropriate and effective communication inception, the CPM triggers successful knowledge discourse.

Whereas the communication inception stage is defined by managerial decisions and planning, knowledge discourse happens on the operational level.

It is the exchange of unstructured, project-relevant information between operational team members on client and service provider sides.

Effective knowledge transfer represents the outcome of the knowledge discourse element, whereby the service provider has acquired the knowledge it needs to fulfill the project tasks.

Following the SSM, we revised and added detail to the basic model to incorporate all of the relevant constructs and influences and ultimately to establish a model, which explains the problem situation. The detailed model (figure 2) breaks down the key aspects of an OOSD transition phase into their constituent parts and shows relevant feedback loops. We define the project environment as comprising the elements: scope, distance, cultural differences, technological resources, control, and competencies and capabilities.

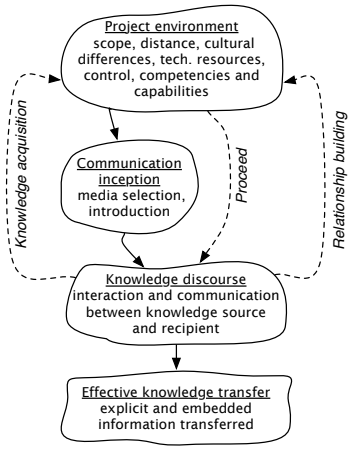
We define the *scope* as the characteristics of the project, in terms of the scale, timescale, complexity, and requirements. *Distance* refers to the influences and constraints on the project resulting from the physical distance between the parts of the team. This includes time zone differences that are common in OOSD projects and can potentially have a significant impact on knowledge discourse between client and service provider because real-time communication may only be feasible for a small proportion of the working day.

As was identified in the description of the problem situation, *cultural differences* between the client and service provider are an important constituent of the project environment. These may refer to individual cultural differences or organizational differences, reflected through differing company practices and norms. OOSD projects frequently bring together teams from very different cultures. Perhaps the key impacts of cultural difference are in relation to team hierarchy and the client-service provider relationship. In cultures where strong team hierarchy is the norm, project officers tend to defer to managers (and service provider tends to defer to client) on all matters. Researchers have pointed out that knowledge sharing environments should be managed differently in different parts of the world [38, 39]. With reference to the transition phase of OOSD projects, this indicates that the optimal project environment is dependent on a range of factors and should be managed accordingly.

Because communications media are used as substitutes for face-to-face interaction in offshore projects, *technological resources* are an important element of the project environment. This includes infrastructural considerations (e.g. speed of internet connection and integration of systems) that can impact the viability and quality of certain modes of communication. Because different media have significantly differing characteristics, in terms of richness, speed, and synchronicity, the availability and selection of media is an important consideration. Researches have noted the important role of technical resources in the information acquisition and attitude formation process [40].

Control refers to the influence of the CPM in setting-up, initiating, monitoring, and managing the transition phase. Monitoring of the transition phase by the CPM informs whether amendments are needed. This may include, for example, altering elements of the project environment, such as media selection or more significant changes such as re-planning and re-iterating the communication inception if it were found to be ineffective the first time.

Figure 2: Detailed Model



The *competencies and capabilities* of the team in terms of communication and cooperation skills is dependent on the capabilities of individual staff members. It is often the case in OOSD projects that the CPM has minimal information about his offshore team members before project commencement. The CPM typically only has copies of CVs, which give little or no insight into communication and cooperation competencies. When setting up the project environment, it is therefore essential that the CPM gains greater insight into the broader abilities and competencies of their offshore team members so that they can arrange the rest of their project accordingly.

By making a direct connection from the project environment to *communication inception*, the model indicates that the CPM has to take into consideration all aspects of the project environment to establish an appropriate and successful communication inception. For instance, differences in culture, communication habits [41] and attitude towards hierarchy [32] might influence the arrangement of the first meeting between team members. Communication inception also involves some form of structured knowledge transfer—

typically the project background and specifications, which are communicated by the CPM.

Knowledge discourse entails interaction between operational team members, defined by the knowledge recipient (service provider) analyzing the project specifications, followed by an unstructured exchange of questions and answers between client and service provider to ensure the information fully understood.

The model includes two feedback loops from knowledge discourse to the project environment. The *knowledge acquisition* loop comprises team members learning, improving knowledge, and improving skills and competencies that contribute to the enhancement of the project environment. Effective knowledge discourse also contributes to relationship development among team members, which, over time, enhances the project environment. As noted, relationships are important for the transfer of unstructured knowledge [38], and while relationships develop more slowly with remote colleagues, interaction through information and communication technology can be a basis for relationship building [42]. The project environment may also be altered through active intervention by the CPM in the midst of the project, for instance, through altering media selections or elements of the project scope. Depending on the nature and extent of the alterations, the CPM may consider that re-iterating the communication inception stage is appropriate. Alternatively, he/she may decide that the transition phase can continue without re-incepting communication, which is represented in the detailed model through the *proceed* arrow.

The outcome is represented by the effectiveness of the knowledge transfer, defined by the speed and success of relevant knowledge being acquired by the service provider.

6. Comparison

To consider the applicability of the conceptual model to real-world situations, we compare the model to the problems identified in the case studies to assess whether the problems can be explained through the model. In relation to *knowledge*, the case studies identified knowledge gaps whereby SP developers had limited background knowledge relevant to the project (**P1**), and seeking to address these gaps in the midst of the project proved challenging (**P2**). These problems can be explained through the model in that the CPM failed to achieve an appropriate communication inception. This led to the lack of interaction between knowledge source and recipient, resulting in ineffective knowledge discourse and knowledge gaps not being recognized early. The inclusion of the *knowledge acquisition* feedback loop in the model recognizes that knowledge gaps are a common feature of offshore working and that gaining knowledge through effective knowledge discourse is an important element of the project. In the case studies, the knowledge gaps were unexpected, and, in effect, the knowledge acquisition loop was achieved late and inefficiently.

By identifying *competencies and capabilities* as an important element of the project environment, the model can explain the problem identified in the case studies that developers on the SP side often lacked communication and cooperation skills (**P3**). In the case studies, the CPMs knew nothing about their offshore team members aside from the information in their CVs, which provided no insight into communication or collaboration skills. As a result, they were unable to plan an appropriate communication inception or instigate effective knowledge discourse. Connected with this, the lack of coherent media selection, which was recognized as a problem in the case studies (**P4**), is accounted for in the model through the inclusion of *technological resources* (which include both availability and choice) as an element of the project environment that the CPM can influence.

The problems associated with cultural differences (**P5 and P6**) identified in the case studies stemmed primarily from stronger team hierarchies on the SP side, which resulted in the inhibition of effective information flow between team members and operational team members on the SP side deferring to managers and failing to use their own initiative in delivery of project tasks. In the case studies, the CPM failed to appreciate that cultural differences between client and service provider were a key element of the project environment, resulting in failures in setting up the communication inception and knowledge discourse appropriately. By specifying that knowledge discourse is necessarily a two-way process, and including cultural differences in the project environment, the model makes it explicit that cultural differences need to be bridged to achieve effective interaction. Furthermore, the inclusion of relationship building as an outcome of knowledge discourse shows the importance of overcoming cultural difference to support both the transfer of unstructured knowledge and the enhancement of the project environment.

7. Discussion and Conclusions

We addressed our first research question (*What kind of knowledge transfer problems do project managers face in the transition phase of offshore outsourced projects?*), through analysis of two case studies involving real-world OOSD projects and investigating relevant related concepts in the existing

research literature. This process identified six typical knowledge transfer related problems, which we grouped under three broad themes: knowledge, communication, and cultural differences.

To address the second research question (*How does the set-up of the transition phase influence unstructured knowledge transfer?*), we adopted the SSM to better understand and model the transition phase of OOSD projects to help us identify what elements of project set-up impact on knowledge transfer. By identifying that the transfer of unstructured knowledge between operational team members is necessarily a two-way communication process, we reframed this interaction as *knowledge discourse.* In so doing, we highlighted the importance of relationship building among operational team members and the need to overcome cultural differences to achieve this.

Through a process of structuring and delineating the key constructs and sequences in the transition phase of OOSD projects, we identified communication inception as a key stage that the project manager controls, which is the basis of relationships between operational team members and influences the effectiveness of communication.

Furthermore, by identifying the key elements of the project environment, we highlighted the variables that project managers should take into consideration when planning communication inception. This process highlighted the importance of factors that have, to date, been little considered in the field, including the strong influence of communication and cooperation competency on the efficiency of unstructured knowledge transfer.

As is well documented in the research literature, team building and trust between team members is an important success factor in global teams [e.g. 43]. Whilst relationships between team members are instigated in the communication inception stage, we found that they develop and build in the knowledge discourse stage. By identifying that both knowledge acquisition and relationship building are outcomes of knowledge discourse (through the feedback loops on the model), we highlight the duality and inter-dependency of these elements.

Knowledge transfer is of fundamental importance to OOSD projects and must inevitably be achieved in a limited time frame. This is especially true for SMEs, which are more likely to be subject to stringent time and resource constraints than larger organizations. By indicating that relationship building can be considered an outcome of effective knowledge discourse, the model demonstrates that these two key elements of the transition phase can be achieved concurrently, thereby potentially saving time and costs.

Existing project management literature focuses on communication largely from the perspective of structured knowledge transfer and provides little research insight into the transfer of unstructured knowledge. Our model contributes to the research community by providing a framework for the analysis of unstructured knowledge transfer in offshore outsourcing scenarios. By separating the communication process in the transition phase into two distinct elements, communication inception and knowledge discourse, the model provides a new perspective of knowledge transfer, which builds on current understanding. Our definition of unstructured knowledge transfer as a two-way action recognizes the embedded nature of knowledge [44] and supports the argumentation from Argyris and Schön that learning is a "double loop" process [45]. Our model extends other established knowledge transfer models, such as that from Ko et al. [46] by specifying the influence of communication inception, as well as the importance of active dialogue between participants. The centrality of a relationship development between knowledge source and recipient in our model reinforces understanding in the field that a level trust between participants is essential for transferring embedded knowledge [46].

We view communication inception and knowledge discourse as 'sensitizing concepts', in the sense that they lack firm definition, but are intended as a basis for further research and investigation. In introducing these concepts we seek to contribute to improved definition and understanding of knowledge transfer processes.

It is hoped that by structuring the knowledge transfer process, and defining the influences, sequences and feedbacks, the model will benefit practitioners in the planning and practice of knowledge transfer in offshore projects. In addition, it is intended that the model will support post-hoc analysis of knowledge transfer, thereby informing and supporting improvement of processes.

It is inherent to the exploratory nature of this paper that it has several limitations. Our model was established based on analysis of two case studies, which is far from a comprehensive sample. Furthermore, the SSM does not fulfill the standards of a causal theory and lacks the rigor of some other research methodologies [47]. However, it is not the role of exploratory science to assert causality. Our study seeks to report effects observed in the field, and the SSM provides a model that helps to understand reasons why problems occur, which can inform other researchers in developing theory. As noted in section 2, this paper fulfills only part of the SSM. Further research should build on this by seeking to develop guidelines and finding feasible solutions to improve the process of knowledge transfer in OOSD projects.

Further research can also add detail to the model using additional case studies; experimental techniques can be used for further quantifying and characterizing observed effects.

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